

Response to Office Action mailed February 27, 2008
U.S. Appl. No. 10/796,239
Art Unit 3735 – Attorney Docket 1512.166
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Amendments to the Drawings:

Please cancel previously proposed Fig. 9.

Attachment: New Sheet

REMARKS

Amendment to the Claims

The independent claims have been amended to clarify that the supporting shaft is within the planes defined by radially extending electrodes. In this context, where the shaft extends through the tissue to be ablated, distortion of the electrical field by a conductive shaft is of particular concern. It is believed that none of the prior art recognized this problem or fairly teaches its solution.

Objection to the Drawings

Fig.9 has been canceled in view of the rejection by the Examiner.

Claim Rejections 35 USC §102 in light of Gough '143

The Examiner has rejected claims 1-3, 5-11, 14 and 15 under 35 USC §102(b) as being anticipated by Gough.

Claim 1 requires a "support shaft having an electrically insulated cover on an outer surface of the support shaft between a first position and a second position" where the first and second positions are locations of sets of "radially extending" electrode wires operating with current flow between the first and second sets.

Generally, Gough does not teach bipolar current flow between axially separated radial antennas. For this reason, Gough does not teach or suggest the problem of a metallic shaft distorting the ablation zone between these axially separated radial antennas, or the benefits of insulating the outside of the shaft between the axially separated radial antennas. Gough instead teaches simply insulating the antennas from the shaft.

The only embodiment in Gough showing two pairs of radially extended electrodes is that shown in Fig. 8 which is described as depicting the deployment of "two secondary antennas from the primary antenna". The Applicant agrees with the Examiner that a person of ordinary skill in the art would understand the primary antenna to be the trocar

14 and the secondary antennas to be 16 and 16'. In this respect, Gough teaches that the trocar must be uninsulated between the wire sets 16 and 16' shown in Fig. 8 in order to allow the receipt of current, thus teaching away from the present invention where the trocar is insulated between the wire sets. It must be emphasized, that in this embodiment of Gough, the current flow is clearly between antennas 16 and the trocar 14 not between antennas 16 and 16'.

The Examiner suggests that the fact that primary antenna is also a "trocar" (a sharp pointed surgical instrument) is intended to convey that its use as an antenna is optional. Applicant disagrees and points out that this logic would suggest that the ability of the trocar to penetrate tissue might also be optional -- something clearly not intended or taught.

The Examiner attempts to remedy the deficiencies of the teaching of the bipolar electrode of Fig. 8 by borrowing features from a monopolar electrode shown in Fig. 1 and described at column 5, lines 48-55. There is no teaching suggestion for this modification, but perhaps more importantly it would render the embodiment of Fig. 8 inoperative because the intended bipolar current flow would be blocked if the trocar were fully insulated as proposed.

The Examiner also attempts to remedy the deficiencies of the teaching of the bipolar electrode of Fig. 8 by suggesting that the problem of a central uninsulated shaft is recognized by Gough in the embodiment of Fig. 4 which provides a "minimal central core that is not ablated". This benefit obtained with an uninsulated shaft per Fig. 4 of Gough cannot be a teaching of the present invention which requires an insulated shaft.

The Examiner asserts that Gough's recognition that a metal shaft may sink current (when used in bipolar mode) requires that the shaft should be insulated. Exactly the opposite is taught by Gough which requires the shaft remained uninsulated expressly to sink current as taught by Gough.

The Examiner suggests that Gough would be naturally led to insulated the shaft to prevent heating of the tissue near the shaft. There is no indication that this problem of heating tissue in the center of an ablation zone exists or was recognized in the prior art. The present invention is intended to provide heating throughout the ablation zone including near the shaft.

Claim Rejections 35 USC §103 in light of Gough '143 and Swanson

Claims 1-9, 13, and 16-27 have been rejected under 35 USC §103(a) as being unpatentable over Gough '143 and Swanson.

Power Spectrum Of The Ablation Signal

Swanson is cited without reference for the proposition that using frequencies in the 1 kHz range for ablation is known. The Applicant disagrees that Swanson teaches ablation using energies concentrated below 100 kHz or 10 kHz as claimed. Swanson quite clearly contemplates a concentration of energy above these ranges (500 kHz). See column 8, lines 4-6.

Swanson does teach an impedance relationship that extends from 1 kHz to greater than 100 kHz which is used to detect whether tissue has coagulated, but this does not suggest that power is concentrated in these regions during treatment, nor is this impedance measurement linked to changing the frequency of power used for ablation.

The Examiner suggests that higher resistivity in the tissue equates to more power deposition in tissue however the Applicant believes this is mistaken. Generally power transmission requires a matching of impedance which can occur at high or low impedances depending on the driving circuitry. The Applicant requests documentary evidence in support of the Examiner's assertion, if this assertion is relied upon.

Current Flow in the Axial Direction between Multiple Radial Electrode Sets

The Examiner states that the present invention's providing of axial current flow between multiple sets of radial electrodes would be obvious because it would ablate a tumor more quickly than taught by the prior art of Gough '143. While the Applicant believes that the present invention performs better than the prior art, this in itself cannot be justification for finding of obviousness of the invention and in fact, superiority over the prior art supports a conclusion of nonobviousness. The Examiner should provide objective evidence that a person of ordinary skill in the art would be led to the present invention. Such a person would consider not only speed of ablation, but uniformity of ablation, constraints on real power, the ability to prevent charring of the tissue, and the ability to transfer energy effectively into the tissue. The Examiner has failed to make a prima facie case that the benefit of the design of the present invention was recognized by those of ordinary skill in the art at the time of this invention, counter to the evidence of Gough.

Insulation Of The Trocar In The Ablation Region

The Examiner suggests that insulating the outside of the trocar provides no unexpected benefit since it prevents current from being grounded through the trocar. The Examiner may be suggesting that insulation of the outer surface of the trocar is required to prevent a short-circuiting of two sets of radially extending electrodes. However, this is incorrect. As Gough teaches, a shorting of the electrodes (antennas 16) can be prevented by insulating outer surfaces of the electrodes 16 rather than the outer surface of the trocar 14. See generally Fig. 1 of Gough. Thus there is neither motivation nor teaching of the insulation claimed by the present invention in Gough.

To the extent that the Examiner's rejection is based on official notice, the Examiner is requested to provide a citation to the prior art or other documentary evidence.

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It is submitted that claims 1-9, 13 and 16-27 define patentable subject matter. A Notice of Allowance is therefore respectfully requested.

Should the Examiner consider any other fees to be payable in conjunction with this or any future communication, the Director is authorized to direct payment of such fees, or credit any overpayment to Deposit Account No. 50-1170.

The Examiner is invited to contact the undersigned by telephone if it would help expedite matters.

Respectfully submitted,

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